April 2021 No. 288

TAUNTON'S

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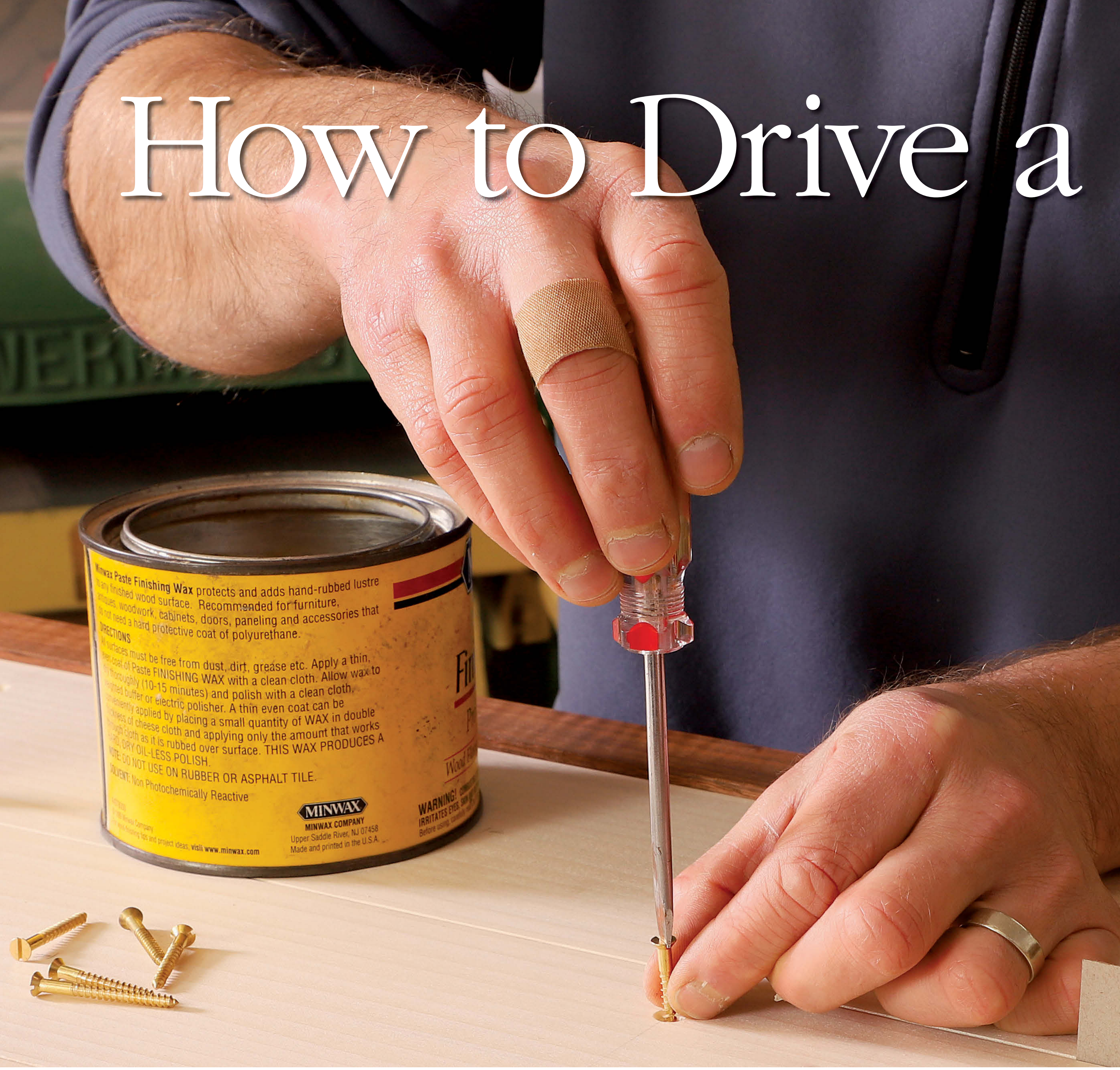
- Tenoning jig
- Carved side table
- Installing screws
- Make a handplane
- Cutting boards

Remembering Philip C. Lowe, p. 28

How to Drive a



I frequently use screws in my furniture, in places where they won't be seen like the backs, bottoms, or insides of pieces. First and foremost, screws allow me to fine-tune the fit of a joint or assembly before committing to permanently joining parts. I can assemble parts, disassemble to make adjustments, and then reassemble. Second, screws add strength. When installed properly, they are extremely strong in terms of clamping force, shear strength, and resistance to withdrawal. By using screws to hold together an assembly, I can generally omit most or all clamps during glue-up because the screws provide the clamping force. Some assemblies can't be glued but still need to be held tightly together—a perfect use for screws. And third, screws are efficient. They are cheap and easily sourced. And installing screws doesn't require expensive equipment. There is a broad spectrum of screws available for all sorts of uses, but here I'll focus only on traditional wood screws for furniture.

A drill press makes everything easier

My first piece of advice regarding the use of screws is to use a drill press. For the first five or so years of my career, not having

Photos: Jonathan Binzen

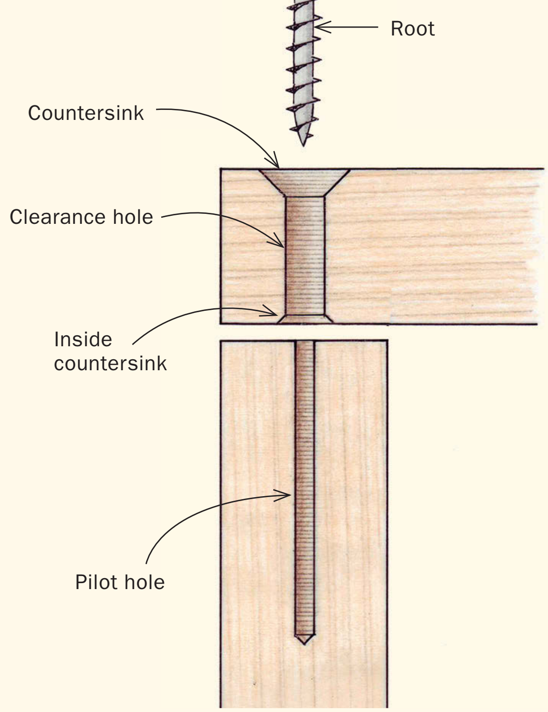
Screw

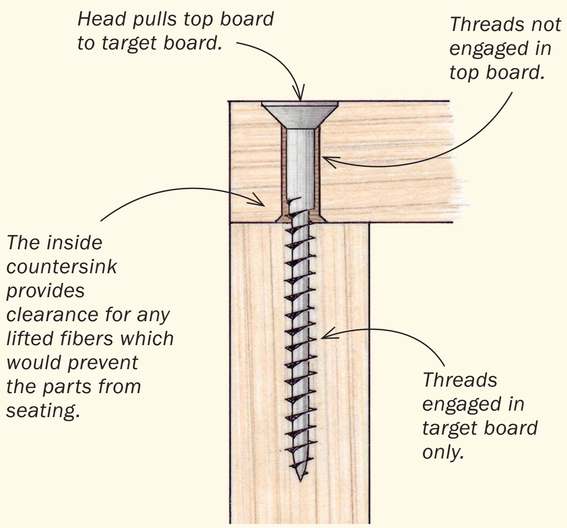
Tips and strategies for using this essential fastener for furniture

BY MIKE KORSAK

ANATOMY OF A WOOD SCREW

On cut screws, like the traditional wood screws Korsak uses, the diameter of the threads is the same size or smaller than the shank. On rolled screws, like drywall screws, the threads are larger than the shank.





A TIGHT-FITTING SCREW JOINT

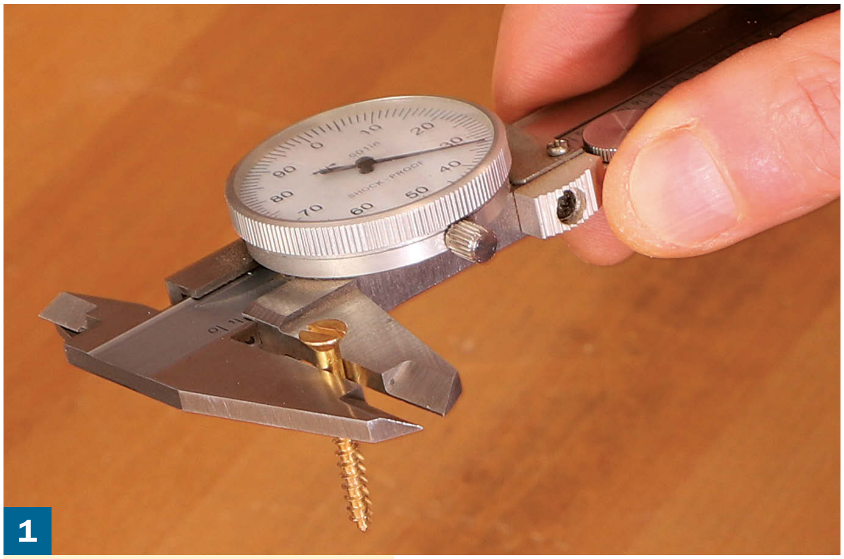
a drill press, I drilled all holes, countersinks, counterbores, etc. with handheld power drills. That worked, but once I acquired a drill press, the benefits of using one became immediately evident. The most obvious advantage is that the holes get drilled perfectly vertical. But there are many other benefits. With a fence and stop blocks, you can quickly and efficiently drill precisely located holes in multiple parts that share some common reference edge or end.

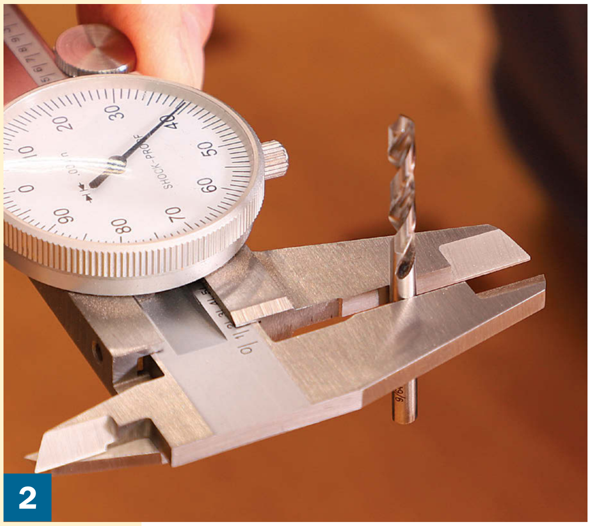
Also, when employing fences and stop blocks, you can perform multiple processes that share the same centerpoint. For example, if I change from a drill bit to a countersink bit, the through-hole

Drawings: Vince Babak

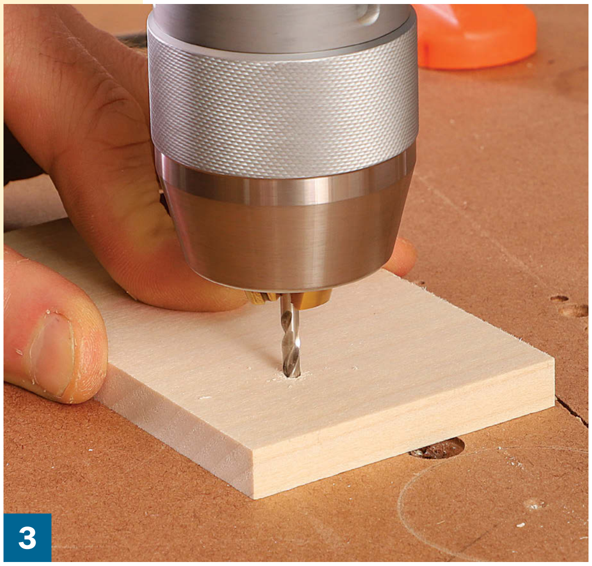
Size the drill bits for the job

1. CLEARANCE HOLE





To determine the diameter of the clearance hole, use dial calipers to measure the shank of the screw **(1)**. Select a bit that matches the size of the shank; if none is an exact match, pick the next larger size **(2)**. Then test the fit at the drill press. Using a scrap of the same species you'll be drilling the clearance hole in, cut a sample hole **(3)** and test the fit of the screw. It should slide in easily **(4)**.



and countersink will be exactly concentric, which is definitely not the case when doing this by hand. Plus, the depth stop of a drill press allows for much more accurate control over how deep countersinks and counterbores are drilled.

Clearance and pilot holes

Understanding and properly sizing clearance and pilot holes is key to working with screws. Improperly sized clearance or pilot holes can lead to splitting, gaps between parts, or stripped threads or screw heads, even broken screws.

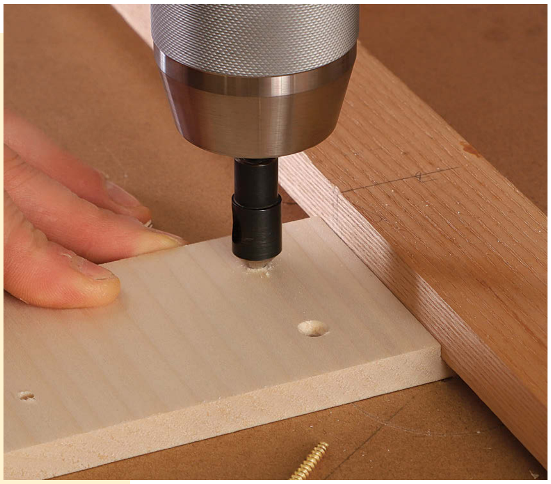
The clearance hole is sized to the outside diameter of the threads (or the outside diameter of the shank—whichever is bigger). Clearance holes should be large enough to allow the screw to slide freely in and out. This ensures that the screw's head will act like a clamp and pull part A tightly against part B. With an undersize clearance hole, the screw threads engage with both parts and negate the clamping action of the screw.

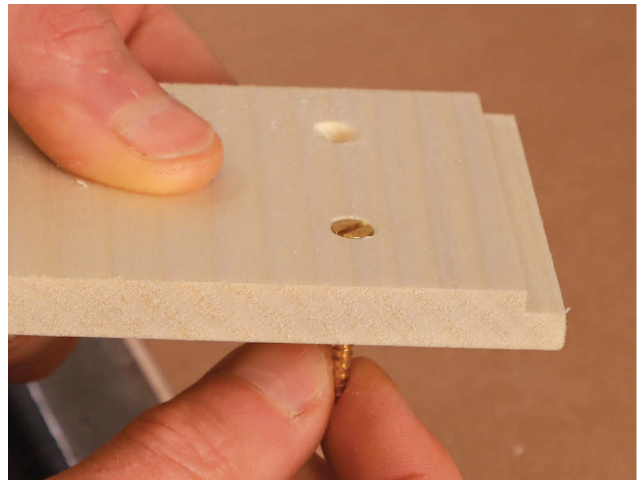
The pilot hole, drilled in part B, is sized to the root diameter of the threaded portion of the screw. If a pilot hole is too large, there is very little wood left for the threads to engage with, leading to a weak connection prone to stripping. If the pilot hole is too small, the screw can act as a wedge as it's driven and split the wood. Plus, the screw can be very hard to drive, causing a stripped screw head, or worse, a broken screw leaving part embedded in the wood.

To ensure that clearance and pilot holes are properly sized, I use dial calipers to measure the shank and root diameters. I do this every time I use screws, measuring one screw of a given batch. I could make a chart, but I prefer to take a measurement because there are

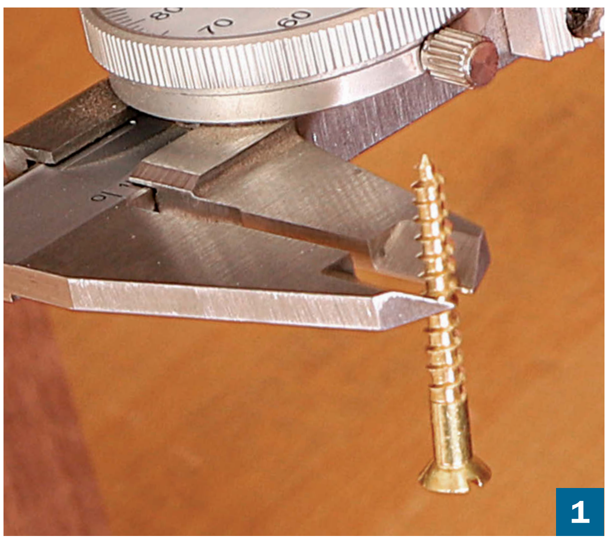
2. COUNTERSINK

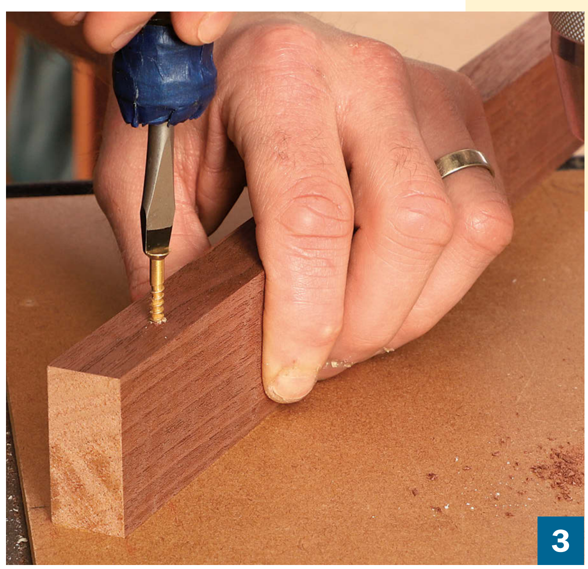
At the drill press, guide the countersink to the clearance hole by eye, but grip the workpiece with moderate pressure so the bit can center itself (right). Set the depth stop so the screw head sits just shy of the surface (far right).





3. PILOT HOLE





Place the tips of the dial calipers between the threads to measure the screw's root **(1)**. Using a scrap of the same species you'll be driving into, drill a test pilot hole **(2)**. If the wood is dense, select a bit slightly larger than the root of the screw; for a very soft wood, choose a bit slightly smaller than the root. Drive a screw into the test hole to be sure the fit isn't too tight or too loose **(3)**.

differences between screws of the same size made by different manufacturers.

Sometimes the caliper measurements correlate nicely to drill bit sizes. Sometimes they don't. If the shank diameter does not correlate to a standard drill bit size, I always use the next size larger. Yes, the clearance hole will be slightly larger than needed, but that's better than being undersize. If the root diameter doesn't correlate to a standard drill bit size, I make a judgment call based on the material I'm working with. If the screw will be threaded into a low-density species (poplar, spruce, white pine, etc.), I'll select a drill bit slightly smaller than the root diameter. If it's a dense species like bubinga or oak, then I'll use a drill bit slightly larger than the screw's root diameter. If in doubt, I always drill a hole in a scrap of the species I'm working with and drive a test screw.

Put together an efficient installation routine

1. PRE-DRILL THE STOCK

Hints, tips, and tricks

A few other details: First, always lubricate your screws to make driving them easier. Even with properly sized pilot holes, screws can sometimes be hard to drive, especially if you are using very long screws or dense material. Paste wax makes a world of difference and can eliminate stripped or broken screws.

When a screw is driven into a pilot hole, the threads lift the fibers at the surface. These fibers can prevent boards from being pulled together tightly, especially in dense species. To eliminate that possibility, I cut a small countersink on one of the boards being joined, on the mating face. This provides a space for the raised fibers and ensures a tight interface between boards.

Screws let you assemble and disassemble a joint multiple times. But it's possible, when driving a screw back into a previously used hole, to cut a new set of threads in the hole and weaken its holding power. The trick is to first turn the screw counterclockwise while pushing the screw into the hole with just a bit of force. As you do, at some point you'll feel the screw "click" into place. Start turning the screw clockwise and it will track into the previously cut threads.

Putting it all together

Here's an example of how I use screws. I like to make the backs of case pieces out of several boards, gapped to allow for movement, attaching them to the case with countersunk flat-head screws.

First I drill the clearance holes. After measuring the screw and selecting the bit, I set the depth stop so

To cut a series of clearance holes in the back boards of a cabinet, Korsak sets a fence on the drill press (1), then sets the depth stop so the bit will just penetrate the sacrificial sheet of MDF on the table. Using the fence and layout lines struck across the back board, Korsak drills clearance holes on both edges and both ends (2).With the fence at the same setting as for the drilling, Korsak cuts countersinks on each of the clearance holes (3). Then he turns the back board over and resets the depth stop to cut very shallow countersinks on its inside face (4); these will prevent gaps caused by any fibers that are lifted when he drives screws into the pilot holes.

the bit will bore just into a sacrificial piece of MDF clamped to the drill-press table. I hold a back board's edge against the fence and drill all the holes along one edge, then repeat for the other edge.

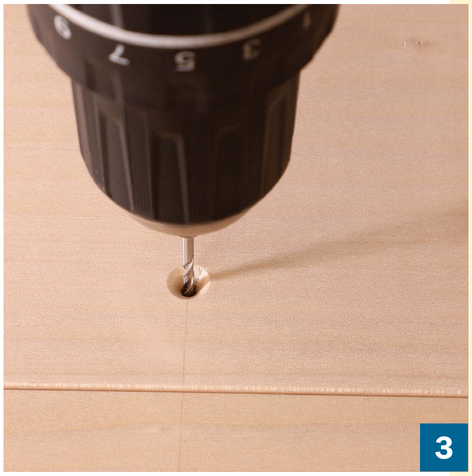
Next I chuck a countersink bit in the drill press and, using a test scrap, reset the depth stop so the screw heads will sit just below the surface. Placing a back board against the fence, I align a clearance hole to the countersink bit. This is done somewhat by eye and somewhat by feel. As I bring the bit down and engage it with the work, I slightly loosen my grip on the back board while keeping it registered against the fence and let the countersink bit slightly shift the board laterally to find the center of the clearance hole, then bring the countersink bit down to full depth.

After cutting all the primary countersinks I reset the depth stop to cut the small countersinks, maybe ⅛ in. deep, that accommodate the fibers raised when the screws are driven. I flip the back boards over, so that their outside faces will be down on the drill-press table. Now I mill shallow countersinks on the inside faces of the back boards at all clearance hole locations.

Now I put the back boards in place on the cabinet. I chuck the clearance bit into a handheld drill, insert the bit into each of the clearance holes, and drill into the interior shelf by ¹⁄₁₆ in. or so, just enough to make a dimple. The dimple will serve to center the bit as I drill the pilot hole with the handheld drill. To keep the pilot hole bit perpendicular to the work, keep the bit centered in the clearance hole by eye; it's surprisingly easy to do. After vacuuming each hole, wax and drive the screws, and installation is complete. □

Mike Korsak drives screws in Pittsburgh, Pa.

2. ATTACH THE BACK BOARDS



With the clearance holes and countersinks cut, Korsak slides the back boards into place (1). Using the clearance hole bit, he drills a very shallow dimple in the back edge of the shelf (2). This will act as a centering device for the pilot hole bit. Shifting to the thinner bit, Korsak drills the pilot holes (3), sighting the clearance hole to keep the pilot bit centered. With all the pilot holes drilled and screws waxed, he installs the screws to finish the assembly (4).